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SCIENCE NEWS LETTER

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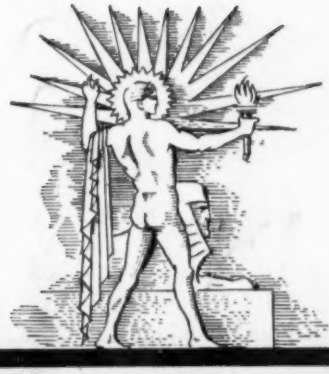
THE WEEKLY SUMMARY OF CURRENT SCIENCE •



March 1, 1941

Supercharged Pilot

See Page 133

A SCIENCE SERVICE PUBLICATION

Do You Know?

Pale colors are fashionable in Britain—they require less *dye*.

An *airplane engine* may contain more than 8,000 separate pieces of metal.

A process for making *artificial wool* from peanut meal has been patented.

All *eggs* laid by one hen are likely to be of similar size, shape, and color, with minor variation.

The U. S. Bureau of Mines has contrived a mechanical *house shaker*, to study vibration hazards that blasting causes to nearby buildings.

Had the *population* of the United States continued growing as it did up to 1900, there would be 150,000,000 people now instead of about 131,000,000.

To aid in advancing cultural relations, the U. S. Bureau of Mines is lending technical *motion pictures* from its large film library to Latin American countries.

Europe furnished the capital for the *plantation system* in the New World, Asia provided sugar cane, Africa the laborers, and America the climate and soil, says Dr. Leo Waibel in the Scientific Monthly.

When *Napoleon* was exiled on St. Helena, the British stationed Hottentot soldiers on Tristan de Cunha, 1,500 miles farther south in the Atlantic, lest Napoleon's friends use this island as a base for a rescue.

QUESTIONS DISCUSSED IN THIS ISSUE

Most articles which appear in SCIENCE NEWS LETTER *are based on communications to Science Service, or on papers before meetings. Where published sources are used they are referred to in the article.*

AERONAUTICS

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INVENTION

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PSYCHOLOGY

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WILDLIFE

What did defense activity of 1917-18 do to our resources? p. 141.

England is *employing* more men and fewer women, a trend attributed to evacuation of women to outlying areas.

A simple *self-watering* device for houseplants devised at Cornell University works like a kerosene lamp—a wick draws water from a container below the plant up to the soil.

Great depth of the Mediterranean Sea is a factor that facilitates *submarine* attack.

South America's transcontinental *railroad*, 2,500 miles long from Santos, Brazil, to Arica, Chile, is being pushed to completion with 425 miles under construction and 378 yet to be started.

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BIOLOGY—PHYSICS

Extract Antigens From Germs With Intense Sound Waves

New Method Designed to Prevent Injury to Delicate Substances Which Produce Antibodies in Our Tissues

SQUEEZING and shaking substances valuable in medicine out of cultures of disease germs by means of intense sound waves is the biological feat that has been accomplished by two University of Pennsylvania scientists, Dr. Leslie A. Chambers and Dr. Earl W. Flosdorf.

The substances they obtain belong to the class known as antigens. They are poisons secreted within the germs' bodies. Injected into the human body in suitably small quantities, they may be used in provoking the formation, by our own tissues, of opposing substances known as antibodies, which defeat the germs if they attack later on. Or the antigens may be injected into the bodies of animals, from which blood is later withdrawn for making immune serums for medical use.

Present methods of obtaining antigens involve heating, addition of chemicals, or other treatments that injure or destroy certain of the more sensitively composed antigens. This is what the new method of Drs. Chambers and Flosdorf is designed to avoid. Its treatment of the germs is strictly physical or mechanical, and it can be conducted at a low temperature.

The foundation of their apparatus is a magnetized metal tube, usually made of nickel, which is caused to vibrate extremely rapidly by flowing an alternating electrical current around it in coils. The sound waves thus set up may be either exceedingly shrill, or even so high-pitched as to be in the ultrasonic range, beyond reach of the human ear. In either case, they are made highly intense.

Over the upper end of the metal tube a glass tube is fitted, with a leak-tight rubber joint. Into the chamber thus formed a culture fluid containing billions of germs is poured. Then the current is turned on and the vibrations started. After the treatment has been continued long enough to get out most of the antigens (and incidentally, to shatter most of the germs), the process is stopped, and the liquid is first centrifuged and then passed through a fine porcelain filter, to remove all debris and any of the germs that may have survived the treatment.

The antigens are in the clear, germ-free liquid that has passed through the filters. Some types of these antigens are so sensitive and unstable that they will spoil if kept for only a couple of hours at temperatures a little above freezing. However, if the liquid is frozen at once and the water evaporated out of the ice, the solid, dried residue, now consisting of concentrated antigens, can be kept for a year or more, the experimenters state.

Drs. Chambers and Flosdorf have obtained U. S. patent (No. 2,230,997) on their apparatus and process, on which they have assigned their rights to the University of Pennsylvania.

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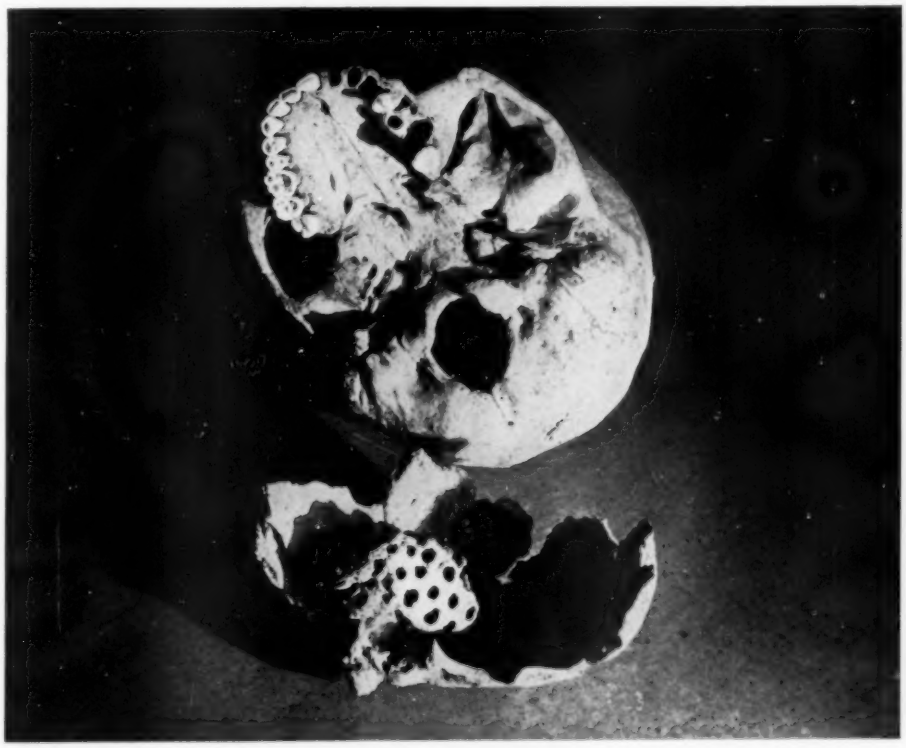

WASP APARTMENT

One of the 300-year-old wasp nests discovered inside skulls of Virginia Indians. The skull above shows the sort of entrance hole used by these wasps in their strange apartments.

ANTHROPOLOGY

Wasp Nests 300 Years Old Found In Indian Skulls

WASP nests built in vacant skulls where brains of Powhatan's Indian tribesmen had been, are the latest revelation of Indian life 300 years ago in the Virginia region of Pocahontas, Powhatan, and Capt. John Smith. Discovery of the wasp nests, which shed light on customs of this historic tribe, was announced by Dr. T. Dale Stewart, Smithsonian Institution anthropologist, to the Anthropological Society of Washington.

So well preserved are several of the 300-year-old nests in the Indian skulls that entomologists here have identified the species of mud dauber wasp that built the homes, and even spied out fragments of larvae inside, Dr. Stewart stated.

The nests confirm scientific belief that the Virginia Indians of the town of Patawomeke held dual funeral rites, first placing the dead high on platforms in a death house, and later holding another ceremony to bury the dry bones. Only in such a sequence, Dr. Stewart reasons, could the wasps have had their chance to build homes inside skulls

which, when now found, were buried deep in covered grave pits.

Adorning Indian children in the ancient Virginia burial ground, Dr. Stewart has discovered copper beads and pendants which point to the important event of white men's coming. Before white man arrived, copper was rare stuff in this part of the East.

Spaniards, adventuring up from St. Augustine to attempt a Virginia settlement 30 years before the English settled Jamestown, probably brought this copper to the delight of the Virginia Indians, it is deduced. Had the copper trinkets been gifts from Capt. John Smith or his settlers, it is inferred that there would be glass beads somewhere among the Indians' buried treasures, also. But no glass has been found.

Science News Letter, March 1, 1941

PSYCHOLOGY

Public Opinion Poll Seen as Aid to Democratic Process

Scientific Sampling Makes It Practical to Secure Public's Views on How Programs Should Be Administered

THE PUBLIC opinion poll, known to the public as a popular means of predicting elections, is seen as a practical method for making the administration of Government more democratic by Dr. Rensis Likert, psychologist head of the division of program surveys of the U. S. Bureau of Agricultural Economics.

For a democracy to function, individual citizens must take the responsibility for solving their own problems, Dr. Likert says in a report incorporated in the new Yearbook of Agriculture.

Rapidly changing conditions such as are characteristic of the world we live in today naturally rouse violent emotions in the individual. These emotions are likely to hinder solving of vital problems raised by the new conditions. If the individual is enraged, he tries to get rid of his problems by smashing through them. If he is overcome by fear of insecurity, as is more common, he tries to escape and evade his responsibilities.

It is this fear that causes individuals to turn to dictators as a child would turn to his father for protection and relief from responsibility, Dr. Likert explains. But the dictatorship, he points out, while it may give a temporary sense of security, fails to satisfy the basic needs of the individual. The dictatorship must rely on fear to maintain itself. And security cannot be built on fear.

A genuine sense of security is built, Dr. Likert says, on the ability of the individual to develop skill in solving his own problems. A democracy must provide extensive facilities and opportunities for its citizens to develop these habits of living and thinking.

Such an opportunity has been found in the scientific sampling of public opinion now used by the Department of Agriculture for the administration of farm policies. It is now possible, he reports, to secure in a relatively small number of interviews the information administrators require in order to direct in a thoroughly democratic manner any programs for which they are responsible.

The "sample" of farmers interviewed must be truly representative—it must have the same proportion of each age group as the population affected by the program being studied; the same geographical representation; the same distribution by income, type of farming, and size of farm; and the same proportion of owners, tenants, and wage hands. And interviewers must avoid "loading" the results by leading questions or other methods.

With these precautions, it is possible to administer government programs in the way that the people want them administered. And it can be done swiftly enough to keep pace with the rapid changes in conditions in an emergency.

Science News Letter, March 1, 1941

In 1931-1934, the United States averaged production of only $30,000,000 worth of *machine tools* a year; 1941 production is to exceed $650,000,000.

TANKING UP

Breathing helium and oxygen and pedaling on the bicycle, Milo Burcham drives the nitrogen gas out of his body and "supercharges" himself for rapid ascent.

RECORD PLANE
This Lockheed P-38 interceptor-pursuit plane, the first of several hundred for the Army and the British, is the one in which a record for horizontal flight was established.

AERONAUTICS

Record For Horizontal Flight Set By "Supercharged" Pilot

Tanking Up in Advance of Flight, Test Pilot Succeeds in Exceeding the 404 Miles Per Hour Already Set

See Front Cover

A NEW speed record for horizontal flight of an airplane has been set recently by a Lockheed P-38 interceptor-pursuit plane, it was announced in Burbank, Calif. The record-breaking airplane is the first to come off the production line, to fill a U. S. Army Air Corps order for several hundred, in addition to nearly a thousand being made for Great Britain.

The exact speed which established the record has not been revealed. However, a recent issue of the British weekly, *The Aeroplane,* which gives details of all the aircraft being made in the United States for Britain, says that its maximum speed at 16,000 feet, is 404 miles per hour. Apparently this was based on a preliminary model that first flew in 1939, so the new record probably exceeds this figure.

The Aeroplane also states that it is armed with four machine guns, and a cannon in the nose. It is powered with two liquid-cooled 1090 horsepower Allison engines. For the R. A. F., the magazine indicates, it is made as a two-seater, with a turret, but the U. S. Army model is a single seater.

Milo Burcham, Lockheed test pilot who set the new record, is shown in the cover picture just after landing. He was himself "supercharged" for his ventures into the stratosphere in testing the new ship. This is done, in accordance with methods developed at the Mayo Clinic, as a safeguard against aeroembolism, a form of "bends" like that which afflicts deep sea divers when they come to the surface too quickly. In the case of fliers, it may occur when they climb above 30,000 feet too rapidly. (*See SNL, Jan. 6, 1940*)

Before he starts, the pilot dons an oxygen inhalation apparatus, with breathing mask and bag connected to the gas cylinder, and pedals a fixed bicycle for 30 minutes. This reduces by about half the nitrogen gas that is contained in the body. Thus the nitrogen bubbles that cause the bends cannot form in the blood vessels.

After taking the supercharging treatment, the pilot cannot breathe ordinary air before his flight, or his efforts are undone. Continuing to breathe oxygen from a portable tank, he enters his plane, and connects with the regular supply.

With older planes, which climbed more slowly, the pilot had started to breathe oxygen at the start of a trip to great altitudes, and by the time he got there, his body was prepared. The P-38, however, has an initial rate of climb of 2,860 feet per minute, so it can reach a dangerous level in the time it takes an average person to walk around the block.

Science News Letter, March 1, 1941

CHEMISTRY

Production of Toluol Aided by New Formulas

TOLUOL, basis of TNT, which is trinitrotoluol, and other chemicals important in preparing for American defense, will be aided with new formulas announced at the meeting of the American Institute of Mining and Metallurgical Engineers in New York. They were developed by Dr. H. H. Lowry, director of the Coal Research Laboratory of the Carnegie Institute of Technology, aided by H. G. Landau and Leah L. Naugle.

These formulas make it possible to determine accurately in advance the properties and amounts of coke and by-products obtained from the carbonization of coal. The chief by-products are tar, gas, ammonium sulphate and light oil. The latter is the raw material from which toluol is obtained, but all the others are important also in defense industries.

In addition to giving scientific control, which assures more accurate planning in the production of the coking by-products, Dr. Lowry's work also makes possible greatly increased economy, by eliminating expensive oven tests. One steel company alone, he stated, has been able to save many thousands of dollars in the single item of eliminating the sulphur analysis of coke.

Carrying Dr. Lowry's work a step further, M. A. Mayers and H. G. Landau, also of Carnegie Tech's Coal Research Laboratory, announced before the meeting, a method for controlling the properties of pig iron and the economy of production in blast furnace operation.

This method ascertains the particular qualities in the coke necessary to produce certain qualities and quantities of pig iron under specific conditions of operation and ore analysis.

Formulas were developed in this research whereby for the first time blast

furnace operators may calculate the quality, economy, and rate of production of pig iron from the properties of the coke used. For these calculations preliminary data, defined in the paper, must be collected on each specific blast furnace operation.

Science News Letter, March 1, 1941

ANTHROPOLOGY

Wool Measuring Device Now Used To Study Human Hair

Cross Sectioning Shows Differences Between Races; Negro's Most Elliptical, Dutch Smallest and Light

A GOVERNMENT scientist's device for measuring sheep's wool has given anthropologists a new idea for measuring tiny breadth of human hairs with such speed that in ten minutes they can gain facts about hair size that used to require two days' tedious work.

Speeding study of racial traits with the new technique, Dr. Morris Steggerda and Mrs. Ruth Eckhardt of the Carnegie Institution of Washington have already set tentative standards of hair sizes for races, they have reported.

Even varied sizes of hair on an individual's head can be charted to show his own limits of hair size in microns, or thousandths of a millimeter. Hair size variation in individuals and races is found to be very great.

First studies, made with hair of America's Mayan and Navajo Indians, Negroes, and Dutch, because adequate hair samples were available, have just been announced.

"It is evident," says Dr. Steggerda, "that the Maya have the largest hair in cross-section, and the Dutch the smallest, with the Navajo and the Negro approaching the Maya very closely."

For the first time, explains the anthropologist, it is possible to analyze also the hair shapes of different races statistically. Negro hair is the most elliptical in shape he has studied. Mayan hair is roundest.

The method adopted for investigating differences in hair was originated for wool research by Dr. J. I. Hardy of the U. S. Department of Agriculture.

Hairs are prepared for testing by washing in carbon tetrachloride and drying, and are made into tiny samples by inserting them in packs of 150 to 200 in a slot in metal, in which the hair tips can be coated with thin solution of celluloid. Once hardened, the tiny hair specimens are cut off with a razor blade, ready to be measured by aid of a microscope.

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GEOLOGY

Walls of Salt May Serve As Shelter for Detroit

PILLARS of salt may serve to protect the entire population of Detroit from aerial attack in case of war. Officials have recently been studying the great man-made caves of old salt mines under the far southwestern part of the city.

Eleven hundred feet deep, these caves were left where millions of tons of salt have been removed. Great salt pillars, left by the miners, support the ceilings. The caves cover 160 acres, of which about 112 are available floor space. With more than 25 miles of passageways 22 feet high and 50 feet wide, there is believed to be enough room to accommodate, if needed, all the 1,618,549 people which the 1940 census showed to be Detroit's population.

The mine is dry and healthful. It is completely air-conditioned by pumps which force fresh air from the surface. The temperature is constant at 58 degrees. So deep is it that those seeking air raid shelter there could not hear an intense bombing raid going on overhead. The heaviest bombs penetrate no more than 50 feet in ordinary soil.

In addition to serving as a shelter, Army officials say the mines might be used for essential industries, as a hospital, or as an ammunition dump.

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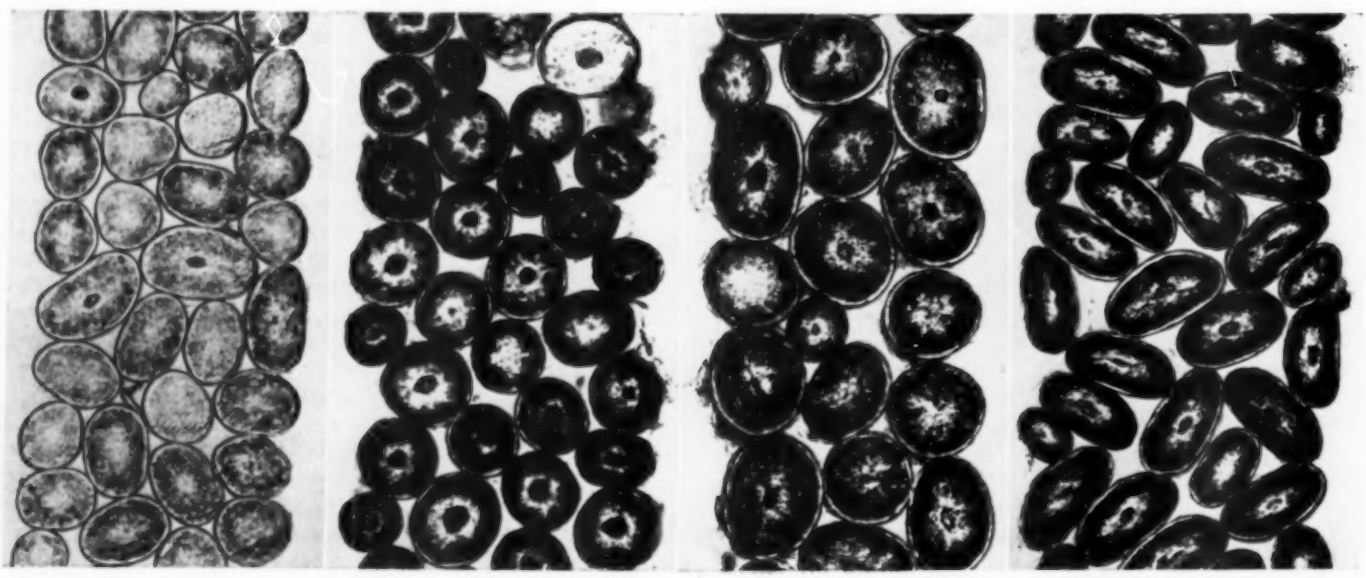
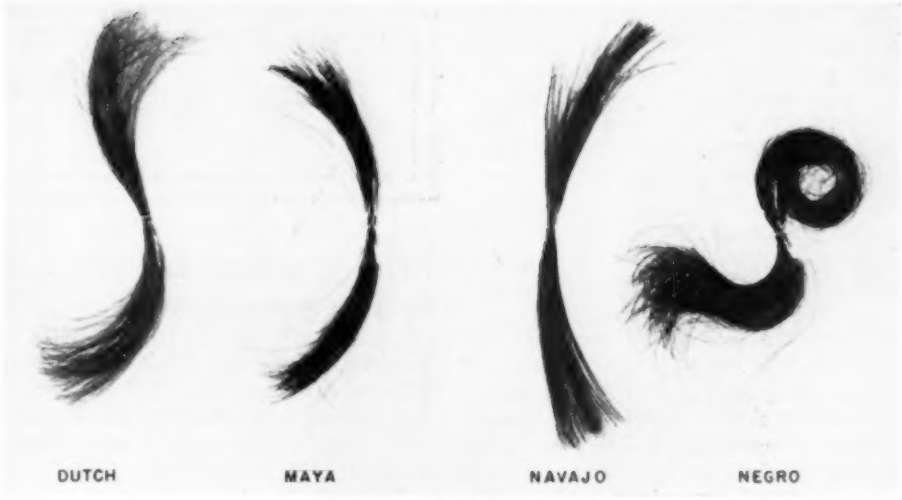
HAIR ON END

Hair samples prepared by a method which quickly sets them in order for measuring. Shown here are magnified cross-sections of (left to right) Dutch, Maya, Navajo and Negro hair.





HAIR FOR MEASURING

Samples of European, Indian, and Negro hair ready to be prepared for the difficult task of quickly measuring breadth of single hairs. That hair of races differs in thickness, or breadth, has long been known, but difficulty of measuring breadth of enough single strands to obtain information of statistical importance has been so great that the subject has remained relatively obscure.

ARCHAEOLOGY

Enthusiastic Over Find Of Lost Incan Cities

Director of Peru's National Museum Declares Discovery Will Increase Understanding of Prehistoric Life

ENTHUSIASTICALLY hailing the importance of two lost Incan cities discovered 12,000 feet high among clouds in the Peruvian Andes, Dr. Luis E. Valcárcel, director of Peru's National Museum and authority on Incan archaeology, now visiting the United States, declares that the ruins greatly increase modern understanding of the prehistoric Incan Empire's mastery of life in high altitudes. He predicts more discoveries in this overgrown area.

The two cities discovered by Dr. Paul Fejos, leader of an expedition sponsored by Axel Wenner-Gren, reveal that a large population of the Incan Empire's Indians occupied a network of cities served by road systems and fed from irrigated farms in a forbidding region now looked upon as rank wilderness. So Dr. Valcárcel pointed out in exclusive comment to Science Service. The noted Peruvian archaeologist is conferring with Yale University scientists on problems of clarifying America's ancient past. Dr. Wendell Bennett, Yale archaeologist who is noted for discoveries in Peru, expressed agreement with Dr. Valcárcel that the ruins add much to knowledge of Incan architecture.

Both of the new-found cities resemble the Incan city of Machu Picchu, discovered by a Yale University expedition led by Dr. Hiram Bingham in 1911, that Dr. Valcárcel concludes that the three cities were beyond doubt contemporary.

Machu Picchu has been thought of as a lonely and isolated retreat built in the dawn of the bold Incan adventure of conquering several million other Indians, and again occupied by women, fleeing the Spaniards in the last days of the Incan Empire. Now, Machu Picchu is blended into a more social picture. Dr. Valcárcel finds its plan, windows, wall niches, stone masonry and pottery goods all similar in type to those of the new-found cities. And among the many stone-paved roads leading out from the new-found cities one road runs to Machu Picchu. In fact, Dr. Bingham's map of the jungle and rock wilderness around Machu Picchu may show this same road, now traced at its farther end.

Excavations and photographs at the new cities contribute greatly to knowledge of the Incan road systems for runners and messengers, says Dr. Valcárcel. Already, the Incas are famous for their prehistoric efficiency in building smooth roads and organizing relay runners to carry messages and goods with impressive speed and service. Now, it appears that Incan efficiency functioned at high altitudes, despite mountain grades and breathing problems. That roads about ten feet wide, extending from the ruined cities are cut in some sections through bed rock impresses Dr. Valcárcel. Stone forts are planted at intervals along the way.

Also impressive to his expert eye are the many stone faced agricultural terraces and irrigation canals, which he pronounces "astonishing at that altitude."

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PHYSICS

Electrons in Glass Houses Get Privacy by Alloy

ELECTRONS that live and work in "glass houses," radio tubes, X-ray tubes and all the other such electronic devices used in science and industry, will have new privacy from invading air molecules with a new alloy.

Consisting of a mixture of iron, nickel, cobalt and manganese, it was devised by Howard Scott, Westinghouse research engineer, who has just been granted a U. S. Patent for his invention. It is known as "kovar."

Several of the tubes sealed by Mr. Scott more than seven years ago, during the early development work on kovar, were opened recently and found to be as free from air contamination as when they were sealed, investigators said.

"Glass and metals expand when heated and shrink when cooled," Mr. Scott explained. "But each kind of glass and each different metal expands at its own particular pace. This rate is called the coefficient of expansion.

"In kovar we found just the right combination of many metals to make an alloy with the same coefficient of expansion as the type of glass we were using. Therefore, when these two substances are fused together under heat and allowed to cool, there is no strain between metal and glass surfaces."

The alloy can also be readily machined and rolled to form parts of various shapes, it was said.

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METEOROLOGY

Storm That Hit Portugal Not Tropical Hurricane

THE VIOLENT storm that struck Spain and Portugal Feb. 15 and 16, causing damage in Lisbon and the Bay of Biscay port of Santander, was not a tropical hurricane, despite its abnormal severity, C. L. Mitchell, of the United States Weather Bureau, told Science Service.

These countries are south of the hurricane belt, he stated. Such storms, which sometimes reach the southeastern United States, generally move westward. Then they may curve to the north, as the New England hurricane of a few years ago did, or curve to the northeast.

Mr. Mitchell said that the Weather Bureau has no data giving the course of the recent storm before it reached Europe. In normal times, radio reports from shipping would have enabled them to follow closely the progress of such a disturbance. These have all been stopped on account of wartime precautions.

Press reports indicate, however, that the storm did come in from the sea. Later it moved on over Europe, though again wartime censorship prevented the Weather Bureau from receiving early and accurate reports.

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RESOURCES

High Purity Magnesium From Scrap Castings

MAGNESIUM production may be increased considerably with a new process. This light metal is so important that the Office of Production Management has caused the entire production in this country to be applied in the defense program. Principal use is in aircraft, since the magnesium alloys are even lighter than aluminum of similar strength.

Charles E. Nelson, chemist of the Dow Chemical Company, is the inventor of the new process. For it he has just been granted U. S. Patent 2,231,023, which, in turn, he has assigned to his employers.

Fundamentally, the process is one of distillation. Pieces of impure metal are melted and vaporized. The vapors condense on a cooler surface. By ordinary distillation, some of the most objectionable impurities are hard to remove. Magnesium in which these are present, especially iron, nickel and copper, corrodes quite rapidly.

Mr. Nelson says that he has found that if the metal is vaporized by heat, in a vacuum chamber, and in the presence of such metals as lead, tin, bismuth, calcium, silicon and antimony, "the impurities can be removed to the extent that the rate at which ordinary commercial magnesium corrodes is greatly reduced."

His patent covers this method, and apparatus for accomplishing it. The magnesium, with from 10% to 50% of lead or other metals, is placed at the bottom of a retort, from which the air is exhausted. The vapor deposits crystals of high purity on a cylinder projecting down from the top and cooled by circulation of water inside. Still higher purification can be obtained by using filters in the retort, a method on which another patent is pending.

With a retort 16 inches in diameter, a pressure inside of 1/25,000th of an atmosphere and a temperature of 1300 degrees F., it is possible to distill off from three to four pounds of magnesium per hour, he says.

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CHEMISTRY

Negatives Can Be Reduced With Patented Chemical

REDUCTION of over-exposed or over-developed photographic negatives can be done with a chemical known as sodium guanidine ferricyanide. According to a recent patent, this has many advantages over older reducers, particularly where it is desired to effect the removal of a slight fogging without affecting materially the rest of the image. (*Patent 2,229,891, assigned to American Cyanamid Co., N. Y.*)

Science News Letter, March 1, 1941

MARINE BIOLOGY

Octopus Named in Honor Of President Roosevelt

AN OCTOPUS species from the Galapagos islands, hitherto unknown to science, has been named *Octupus roosevelti* in honor of President Roosevelt in a new Smithsonian Institution publication prepared by Dr. Helen G. Stuart of the University of Southern California. Specimens of the animal were brought back by Dr. Waldo L. Schmitt of the U. S. National Museum, who was on the presidential cruise among the islands in 1938. A number of other marine species captured on this cruise have already been given the name *roosevelti*.

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IN SCIEN

PHYSIOLOGY

Identity of New B Vitamin Is Now Announced

IDENTITY of a new B vitamin, needed by rats to keep their hair from turning gray, is announced by Dr. S. Ansbacher, of the Squibb Institute for Medical Research (*Science,* Feb. 14).

This member of the vitamin B complex is p-aminobenzoic acid. Besides its role in preserving hair color in black and piebald rats, the vitamin is needed by chicks and bacteria for growth.

Human importance of this vitamin at present probably attaches less to its effect on hair color than to its action on sulfanilamide. Dr. Ansbacher points out that last year D. D. Woods and P. Fildes, in England, reported that in test tube experiments the vitamin, or acid, nullifies the action of sulfanilamide in checking growth of hemolytic streptococci. This seems to raise the question, for medical scientists to answer, whether doses of vitamin B complex which many people are now taking should be stopped during sulfanilamide treatment.

Science News Letter, March 1, 1941

RADIO

Radio Interference Found With Portable Receiver

RADIO interference can be quickly located with a new portable radio receiver especially designed for such service. It can also be used to locate underground pipes. Self-contained batteries, or the regular A. C. or D. C. power lines can be used to run it. (*Sprague Products Co., North Adams, Mass.*)

Science News Letter, March 1, 1941

INVENTION

Lifts Snap On To New Plastic Heels

PLASTIC HEELS for ladies' shoes are now available, and are arranged so that the worn lifts can be pulled off and new ones snapped on, without the aid of nails. A spring on the side of the leather causes them to snap firmly into place. (*General Electric Co.*)

Science News Letter, March 1, 1941

E FIELDS

PHYSICS

Instrument Measures Tiny Variations of Texture

A SURFACE with tiny depressions not more than 1/600,000th of an inch deep would seem very smooth as far as the human touch could detect, but these minute variations from perfect smoothness, which might cause increased wear and possible failure of closely fitting parts in an airplane engine, are revealed by a new instrument—the profilograph.

Speaking before the meeting of the American Physical Society at Massachusetts Institute of Technology, a research trio from the Mellon Institute of Industrial Research told of the new device. They are F. W. Adams, Lee Devol and H. R. Letner. It makes use of a fine tracing point, and a system of magnification with optical levers. That is, the slight movement of a mirror causes a considerable shift of a spot of light reflected by it.

By tracing a series of contours of a surface along parallel paths, they reported, it is possible to prepare a relief map, highly magnified in a vertical direction, of the surface being studied. This, they said, can be done with machined, lapped or etched surfaces used in many industries. It is relatively simple to use, they reported.

Science News Letter, March 1, 1941

CHEMISTRY

Making Calcium Gluconate Speeded by Research

CALCIUM gluconate, valuable drug in the care of expectant and nursing mothers and of other persons needing quick additions of calcium to their blood, can be produced more rapidly and cheaply as a result of new researches by scientists of the U. S. Department of Agriculture.

Until a few years ago, calcium gluconate could not be used in medicine because of its excessive cost. Then Department chemists discovered that certain strains of mold, fed upon glucose solution, could produce commercial quantities of gluconic acid at very low cost. Added to calcium carbonate, in the form of common chalk, it converted that compound into the valuable calcium gluconate.

The most practicable production procedure is to grow the mold in sheets in slowly rotating drums, through which air is forced, for the respiration of the mold plants. Difficulties were encountered when the gluconic acid concentration piled up, retarding the fermentation process. Chalk added at this stage resulted in the formation of a good deal of undissolved calcium gluconate, clogging up the drum.

The difficulties were resolved when three Bureau of Agricultural Chemistry researchers, A. J. Moyer, E. J. Umberger and J. J. Stubbs, discovered that the addition of a little borax or boric acid to the fermenting liquid keeps the calcium gluconate in solution and lets the molds finish their work. Later, the gluconate may be separated from the solution, free from boron.

Be removing the solution from time to time, the same mold growth may be used over and over again. Efforts are now being applied to the problem of making the process continuous instead of semi-continuous, and thus further reducing the cost of making calcium gluconate.

Science News Letter, March 1, 1941

INVENTION

Invention Rejects Slugs Put in Slot Machines

TWO PATENTS were granted to cover attachments to slot machines or telephone pay stations for automatic testing of coins to select only authentic ones and to reject slugs. One was number 2,230,566, issued to Alfred Hakanson, North Arlington, N. J., and assigned to the Peerless Weighing and Vending Machine Corporation; the other, number 2,230,352, to Frederick A. Hoyt, East Orange, N. J., who assigned it to Bell Telephone Laboratories. In each, magnets detect iron slugs, and cause their return.

Mr. Hoyt's invention uses an extra, more powerful magnet to test the electrical conductivity of the coin or slug. As it passes through the field of this magnet, eddy currents are set up in it. Then it hits a small anvil, and bounces into the proper opening. If its conductivity is not correct it hits the anvil with too much or too little speed, and, in either event, misses the hole. As it is necessary for the coin to enter the testing mechanism with a correct speed, it falls first into a V-shaped groove, which almost stops it, so that all coins start with the proper velocity.

Science News Letter, March 1, 1941

AGRICULTURE

Tuberculosis Picked Up By Pigs From Chickens

IT IS very bad for pigs to let chickens stray into their pens, the U. S. Department of Agriculture warns.

Not that the hogs are henpecked. But chickens are carriers of avian tuberculosis, to which swine are more susceptible than the fowls themselves. This has been proved in experiments carried out by scientists of the Bureau of Animal Industry, at the Beltsville, Md., Research Center.

Fifty chickens and 31 hogs, all reacting negatively to the standard tuberculin test, were penned with 50 chickens known to be tubercular. They were kept together for a year, when the tuberculin test was repeated. Positive reactions were obtained from 93.5% of the hogs, whereas only 54% of the previously non-tubercular chickens reacted.

The remedy, Department scientists point out, is obvious and simple. Keep all chickens, even apparently healthy ones, severely away from the pigpens.

Science News Letter, March 1, 1941

ORNITHOLOGY

Rare Whooping Crane Increasing in Numbers

WHOOPING cranes, an almost extinct species, show a slight increase in population on the Aransas National Wildlife Refuge in southeastern Texas. This season's count is 26, as compared with 22 last year.

Total numbers of whooping cranes now in existence are not known, for the bird is very retiring and lives in places as remote from man as possible. Estimates vary from as few as 80 survivors to as many as 200.

Science News Letter, March 1, 1941

INVENTION

Photoelectric Cell Drops Headlight Screen

POLARIZING screens to eliminate automobile headlight glare have been talked about for some time, though they would greatly reduce the efficiency of the lights. To avoid this, an inventor proposes that a photoelectric cell be placed on the front of the car. When another car approaches, this "electric eye" operates a mechanism to lower the screens into place, so that they only operate when needed. (*Patent No. 2,230,262, Leon Pollack, Brooklyn.*)

Science News Letter, March 1, 1941

PSYCHIATRY

Bottlenecks in Production of "Good Society of the Future"

May Be Achieved in Spite of Forces Acting as Barriers If Answers Can Be Found To Certain Practical Questions

BLUEPRINTS for "the good society of the future," drawn according to scientific specifications, were presented by Dr. J. F. Brown, professor of psychology at the University of Kansas, at the meeting of the American Orthopsychiatric Association in New York.

The good society is neither inevitable nor impossible, he said. Standing in the way of its production are five bottlenecks. These are principles of psychodynamics and socio-dynamics which govern man and his actions. They are like the laws of physics relating to the conservation of matter and energy. No one has been able to overcome physical laws to the extent of building a perpetual motion machine, but the discovery of such laws led to redirection of the forces of nature as exemplified by modern use of electricity.

Redirection of the forces of man's nature, Dr. Brown indicated, may come from similar study of the principles governing these forces which at present act as barriers to utopia or bottlenecks to production of the good society. These principles, he stated, are:

1. The Inevitability of Inequality. 2. The Psychobiological Nature of Man. 3. The Sociological Nature of Groups. 4. The Personality of Leaders. 5. The Continuance of Resentment.

The good society can be achieved in spite of these bottlenecks, he indicated, if psychiatrists can find answers to questions such as the following:

"To what extent does intelligence depend on emotional factors? What devices can be used to make it maximal? Naturally the good society," he said, "would require as high an average I.Q. as possible.

"Does actual participation in aggressive behavior, such as combatant service in the present war, serve as a drainage for aggression or does it habituate to brutality Records of individual cases seem to indicate that it may do either.

"Can psychiatry devise an examination which would eliminate the potentially dangerous and potentially psychotic leaders? Can psychiatry devise plans which will make the real prophets have greater honor in their own country?

"Can resentment be eradicated and how?"

Science News Letter, March 1, 1941

Social Infection Sources

SOLVING national and international difficulties by public health methods which have succeeded in controlling epidemics of diseases like tyhoid fever was suggested by Lawrence K. Frank, vice president of the Josiah Macy Jr. Foundation.

"Can we develop a viewpoint and a program in regard to the individuals who create national and international difficulties similar to that which has been developed in the field of public health and sanitation?" Mr. Frank asked.

"This question assumes that the unhappy, distorted individuals who in politics, business, industry, finance and other socially sanctioned activities, may now be regarded as the product of our basic cultural patterns and the education and rearing of children. Therefore, just as the epidemiologists look for infected water or milk supplies when they find an outbreak of typhoid fever, so in the same way we can look for ideas and beliefs and cultural conflicts which foster these distorted personalities, and also look for the methods of rearing and educating babies and children which create these anti-social feelings and drives that are expressed through and in our social life and our international affairs.

"Instead of regarding the individuals who are aggressively hostile and destructive as willful enemies of society, this viewpoint would imply that such individuals are essentially victims of our culture and our society as we are now recognizing with respect to juvenile delinquency."

Science News Letter, March 1, 1941

Hygiene Against Fascism

MENTAL HYGIENE can help the democracies stave off Fascism, Dr. Harmon S. Ephron, of New York, told members of the American Orthopsychiatric Association.

The restriction of freedom imposed on the Germans by Hitler, coming in the guise of Siegfried with the promise of freedom for 1,000 years, is greater than their previous Prussian subjugation, Dr. Ephron pointed out.

Because they were conditioned to obedience and desperately insecure, Dr. Ephron explained, the Germans were "easily duped by the political charlatanry which dramatically presented the 'New Order' as Utopia; they aligned themselves with a leader who is master of the art of creating the illusion of omnipotence and omniscience. They responded to the pomp and hypnotism of a preacher of hate."

The lesson for the democracies is that they must, to preserve themselves, assure to their people opportunity and capacity for self-assertion, so that they will not feel driven to seek escape from their limitations "in terms of illusory grandeur, power and perfection."

Science News Letter, March 1, 1941

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RADIO

Dr. Joseph Hughes, director of laboratories of the Institute of the Pennsylvania Hospital, Philadelphia, will describe new tools, such as brain waves, for the diagnosis of mental illness, and new methods of treatment for mental and nervous disease as guest scientist with Watson Davis, director of Science Service, on "Adventures in Science," over the coast to coast network of the Columbia Broadasting System, Thursday, March 6, 3:45 p.m. EST, 2:45 CST, 1:45 MST, 12:45 PST. Listen in on your local station. Listen in each Thursday.

ASTRONOMY

Lunar Shroud

Moon Wears Thin Grayish-White Mantle of Volcanic Ash Which Serves as Insulation From the Sun's Great Heat

THE moon wears a thin grayish-white mantle—a marvelous garment woven of the ash of volcanic eruptions and the eternal rain of cosmic dust. This cloak shields its ancient rocks from the glaring heat of the sun and wraps in a chill of death the fleshless bones of that weird land whose face from over 200,000 miles away bewitches the dreams of men.

The existence of this strange shroud over a dead world is deduced from recent reports to the Carnegie Institution of Washington by the Committee on Study of the Surface Features of the Moon, composed of astronomers and geologists, and headed by Dr. F. E. Wright. This committee is attempting to extend as far as possible knowledge of the earth's little sister and constant companion, bound to her by the bonds of gravity.

So long as man has existed he has been fascinated by the moon. Some of the weirdest and loveliest legendry of all peoples has been inspired by the luminous orb of night. It has given rise to many persistent superstitions—such as those that relate to its influence in growing crops, which still are held in rural sections of the United States and Europe. Towards the moon's face Galileo turned his first telescope. His were the first eyes to look upon its awe-inspiring mountains and its great plains—far larger in area than any prairie or desert region on earth —which appeared to him to be oceans.

No other spot in the vast realms of space beyond his own planet can man hope to know so intimately. With the improvement of telescopes since Galileo's day the surface of the satellite can be brought to within what appears to be 200 to 300 miles. Details 500 feet apart can be distinguished with good seeing conditions. Every conspicuous detail of the visible face of the moon has been mapped. The altitudes of many of its mountains and the depths of its strange craters have been measured with an accuracy of a few hundred yards.

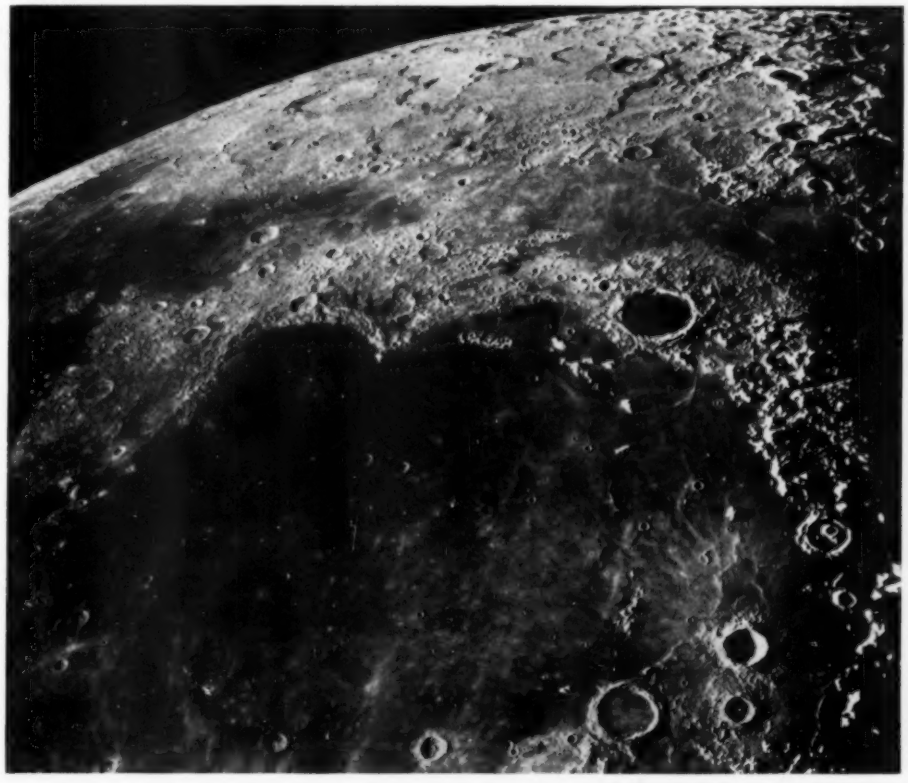
It is a laborious, time-consuming job to proceed beyond this—a job requiring new scientific tools and a vast accumulation of observations before sound deductions can be made. Already, however, Dr. Wright and his fellow members of the Carnegie Institution's Moon Committee have forged their tools and made notable contributions to knowledge of the satellite's surface.

The temperature of the moon's surface in full sunlight is close to 100° centigrade, or 212° Fahrenheit. It receives the full impact of solar radiation—heat rays, visible rays and ultraviolet—with no atmosphere to absorb any of it.

The temperature of its surface after an hour or so of darkness is approximately —98° centigrade or —140° Fahrenheit. From this rapid fall of 350° Fahrenheit it is obvious that different conditions of heat absorption and radiation exist on the lunar surface from those familiar on earth. Analysis of these differences leads scientists to far-reaching conclusions.

The rocks of the earth's mountains, when heated to the boiling point of water and set in a cool place, lose their temperature slowly. On the moon such rocks—if they exist, and there is every reason to believe they do exist since the satellite presumably is of a composition analogous to that of the earth—must be covered by something which acts as an almost perfect insulator. It absorbs very little heat permanently; but reflects back into space instantly most of the radiation which falls upon it. Thus one has the fantastic picture of a land which at noonday is at the boiling point of water on the surface but below freezing a short distance underneath.

There is such an insulating material—a pumice-like substance such as is belched from the boiling depths of the earth by volcanos. The picture may be reconstructed from the most delicate measurements ever made of lunar temperatures. They were carried out at Mount Wilson



FANTASTIC

This is the northern portion of the moon at last quarter photographed at the Mt. Wilson Observatory of the Carnegie Institution with the 100-inch reflector.

Observatory during the total eclipse of the moon on October 7, 1939, by Dr. Edison Pettit, using that delicate heat-measuring instrument, the thermocouple, upon which was concentrated by means of a 20-inch telescope the total radiation from a small point near the center of the moon's disk.

During the partial phase of the eclipse which preceded totality, the temperature dropped rapidly from +98° to −73° centigrade. After the start of the total phase it continued to fall at the rate of about 30° centigrade an hour, but by the end of the first hour this rate had declined to 7°. The low point reached was −98° centigrade.

Laboratory tests show, the Mount Wilson astronomers report, that this would be almost precisely the result to be expected from a layer of pumiceous material 2.6 centimeters thick under conditions such as obtain on the moon's surface. This leaves little doubt that such a film actually covers the moon, since the conclusion is supported by several lines of converging evidence.

Dr. Pettit's measurements also showed that the rate at which energy is radiated is very nearly proportional to that at which it is received on the moon's surface, except at very low temperatures when there is a considerable lag. The satellite, this shows, absorbs very little heat indeed.

Other conclusive evidence for this covering material is afforded by analysis of moonlight carried out by the Moon Committee. Moonlight is just reflected sunshine. The dead moon has little radiation of its own—less so than the earth. Almost like a mirror it reflects and scatters the rays of the sun which strike its surface. Some of this, however, is absorbed in the layer of pumiceous like material and re-radiated. In either case the moonlight which transforms spring nights on earth so magically is not quite the same as the sunlight which fell on the moon, or which falls on the earth. The changes to be expected, as described by Dr. Wright, are of three kinds, as follows:

"A large part of the energy of the incident sunlight penetrates a short distance into the surface and is absorbed, thereby heating the surface material; the heated surface, in turn, radiates the absorbed energy into space as heat waves, or 'planetary heat'.

"Different wave lengths or colors of the incident sunlight may be absorbed in different proportions, whereupon their relative intensities are altered slightly, thus coloring the scattered light. This is known as selective absorption.

"A certain amount of plane polarization is introduced on scattering and reflection. The amount depends on the character of the material and on its surface. In general, dark-colored, opaque substances polarize light much more than do non-opaque substances into which the incident light may enter and be returned in part by internal reflections."

This polarization, or change in the direction of light vibrations from the normal, can be measured quite precisely, largely with instruments brought to a high stage of perfection by Dr. Wright himself. In this way moonlight can be compared with sunlight reflected from materials easily available for laboratory study. There is no exact correspondence. But in general these studies indicate that the substances exposed at the surface of the moon are of the nature of volcanic ashes and pumice high in silica.

"The changes in the amount of polarization in the reflected light for different angles between incident and reflected rays," prove that the lunar surface is rough and not smooth. The changes in the intensity of light from different areas on the moon point to the same conclusion.

"It is true that the observations are restricted to materials at the actual surface and that in certain regions the cover of ashes and pumice may be quite thin and, like a light snowfall, may serve to blanket and conceal whatever is underneath."

More information might be obtained if some naked spot on the moon could be found—some area that has escaped the showers of ashes from the volcanic eruptions. Such might be a steep mountain slope or the inner wall of a deep crater. Efforts are being made with powerful equipment to measure the sunlight reflected from a few such spots.

The committee has also made many observations of the surface features of the moon and has sought to interpret them in terms of the conditions known to exist, such as the absence of atmosphere and water, rapid changes of temperature, and gravity only one-sixth that of the earth. It has made a detailed study of the trajectories of materials hurled out of the lunar volcanoes and found that they are from 20 to 50 times longer than those of materials ejected at the same initial velocity and angle of elevation on this planet.

For a muzzle velocity of 5,250 feet a second, equal to that of the Big Bertha used in the first World War, the range for an elevation angle of 50° was 75 miles. On the moon it would be 2,200 miles. Rays from one of the largest of the lunar craters, white lines extending in all directions from the center, have been traced for approximately 1,500 miles. This would have required, at an elevation angle of 26°, an initial velocity of 4,865 feet a second. Such velocities have been observed during eruptions of the volcano Cotopaxi in Ecuador.

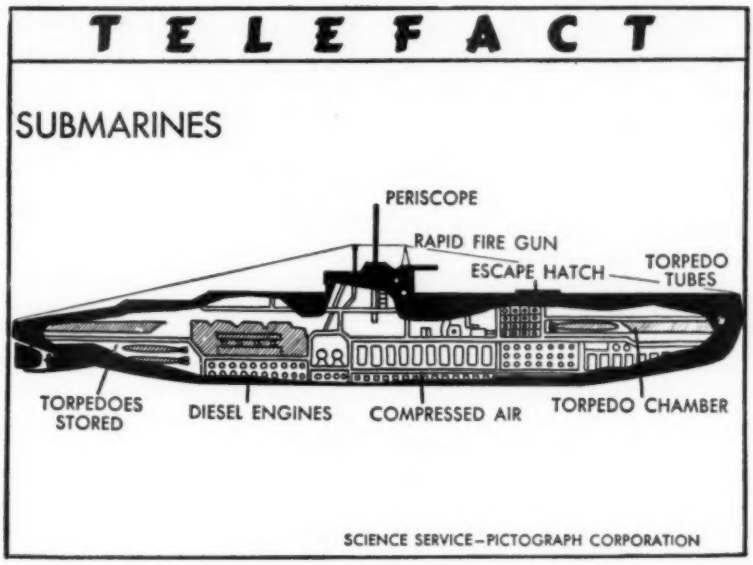
This goes far towards solving one of the most puzzling features of the moon's surface—the great craters with their radiating white lines called rays which are scattered everywhere and some of which are as much as 24,000 feet in depth. During an eruption on earth the ejected material falls near and into the mouth of the crater. On the moon it is scattered far and wide. Lunar craters are cleaned out, as a rule, and thus are of the nature of immense, deep holes in the ground, with the floor of the crater below the level of the surrounding country. Terrestrial craters rise high above the level of the countryside.

It is even possible to make rough deductions on the age of these craters which pock-mark the face of the moon. The floors of the most recently formed ones are whiter and brighter than those of the older ones.

Study of the rays shows that they do not project as ridges above the land they traverse. They cast no appreciable shadows. But they reflect and scatter light more strongly than do the materials of the surfaces over which they extend. The most obvious interpretation is that they are streaks of fine dust or ashes carried along by jets of hot, escaping gases. They gradually settled out along the paths followed by these streams.

Not all the moon craters, Dr. Wright and his colleagues hold, need be volcanic. Both moon and earth are subjected to a constant bombardment of meteors. Here relatively few actually hit the surface. They are burned to ashes by the enormous heat engendered by the friction of the atmosphere through which they pass. The moon has no such atmospheric blanket. The objects from outer space crash into it at speeds of from 15 to 40 miles a second.

Such an impact not only would produce a crater-like hole, but its kinetic energy would be transformed into heat sufficient to melt and even to volatilize the invaded rock. This would give rise to actions that in their effects would resemble closely volcanic phenomena.



WILDLIFE

Discretion in Defense Uses Of Natural Resources Advised

Over-Fishing of Our Waters and Over-Cutting of Forests Among Mistakes Made at Time of World War

NATIONAL DEFENSE uses of irreplaceable natural resources must be guided by discretion, lest harm rather than good result, declared Dr. Ira N. Gabrielson, chief of the U. S. Fish and Wildlife Service, at the Sixth North American Wildlife Conference in Memphis.

Our very zeal for strengthening America can lead us into errors that have an exactly opposite effect, he cautioned, pointing out as past examples the ill effects of over-fishing of our waters and over-cutting of our timber lands during the emergency of 1917-18. The country is still suffering the consequences of the mistakes made by honest but over-enthusiastic patriots in those tumultuous days.

Even worse may be done to us by cold-bloodedly selfish persons who place self-interest ahead of patriotism, and advance the plea of defense promotion only as a Trojan horse for selfish schemes of their own, Dr. Gabrielson suggested. Watch out, he warned, for such things as efforts to cut priceless virgin timber out of national park areas, under the excuse that it is to be used for "defense".

"If this country is to continue to be a good place to live in, or to be one worth fighting for," he said, "we must use intelligently the resources of soil and water, and the products of soil and water, not only in good times but in bad times, and in national emergencies as well as in normal times."

In the course of his address, Dr. Gabrielson reviewed the progress of the wildlife restoration program during the past five years. Land acquisition and refuge creation have gone forward very well, he said, though much still remains to be done. The same is true in the arrangements for cooperation with state and local agencies, especially in basic ecological research. Costs of these programs are defrayed mainly by persons and groups most interested, through sale of "duck stamps" and sales taxes on sporting arms and ammunition.

Somewhat slower progress, though fairly satisfactory still, was noted by the speaker in such fields as educating the public in the recognition of wildlife values, and in the promotion of specific research programs where present knowledge is weakest, especially in the study of the ecology of water areas. Much more needs to be done, too, toward the restoration of fish and of fur-bearing animals. Both of these were once among America's greatest natural resources, and intelligent action can do much to restore them to a large degree of their former importance.

By far the least satisfactory situation, Dr. Gabrielson declared, exists with regard to river and lake pollution. Good progress in the setting up of municipal sewage disposal plants during the past few years is contrasted with virtually no progress at all in getting rid of pollution due to industrial wastes. Most industrialists, the speaker said, have proven stubbornly uncooperative, and he challenged sharply the right of any man to misuse publicly owned waters as private sewers.

Science News Letter, March 1, 1941

Overcrowding Stunts Fish

OVERCROWDED ponds, like overcrowded city districts, produce undersized stunted populations, Prof. H. S. Swingle and Dr. E. V. Smith of the Alabama Agricultural Experiment Station told the meeting. Lack of carnivorous species (*Turn to page* 142)

BOOKS

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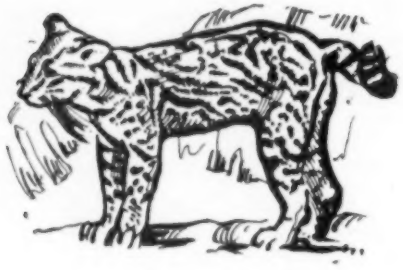
BIOLOGY—MILITARY SCIENCE

NATURE RAMBLINGS

by Frank Thone



For Better Camouflage

DEFENDERS of Britain are learning from animals how to protect possible bomb targets by making them invisible to Nazi raiders. Biologists, with their knowledge of the highly successful principles that animals use in concealing themselves from would-be devourers, are aiding physicists, engineers and others in this work. As a result, the camouflaging of buildings, storage tanks and such objects has become more and more of a scientific job.

The principles known to biologists as general resemblance, special resemblance, disruptive pattern, deflection and mimicry are all now at the disposal of camouflage artists, to be used as the situation dictates.

General resemblance is more commonly employed in military camouflage in the field, where mobile objects are colored so as to be as inconspicuous as possible against any background on which they stop. Special resemblance to particular natural objects is often extremely ingenious. Admirable methods of counterfeiting grass are now available, and artificial woods with "sapless foliage," but permanent greenery spring up where required.

The biological principle of mimicry is reversed in the new camouflage. In nature, harmless creatures are often disguised as dangerous or poisonous species, presumably to frighten off their enemies. In military mimicry, dangerous objects like gun positions are made to look like harmless cottages or haystacks.

In biological deflection, attention of a possible devourer is drawn away from the vitally important individual or part and to something that can be lost without particular harm. Replaceable tails of certain lizards, which can be left in the attacker's possession while the animal itself escapes, offer a good example. The same principle is used in deflecting the attention of air raiders from important parts of a known target to non-vital elements, like empty sheds.

Disrupted pattern, the use of zigzag lines and splotches of color, is perhaps the most widely used of all camouflage methods. Biological examples are the stripes of zebras and tigers, the spots of leopards, the splotchy pattern of the giraffe's skin. Closer study of nature has enabled camouflage specialists to correct the errors of much of their earlier work.

Science News Letter, March 1, 1941

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From Page 141

that remove the surplus population, and heavy weed growth in the ponds, are important contributing factors to this ill state of affairs. As remedies they recommended clearing out the weeds, stocking with large-mouth bass, fertilizing the water to increase the food supply, and thinning out the crowded population by a heavier take of fish.

Science News Letter, March 1, 1941

TVA Fish Studies

NEW LAKES behind the lower dams in the TVA region have shown some interesting ups and downs in their fish population as the waters rose in them, Clarence M. Tarzwell of the TVA Biological Readjustment Division reported. During the first year, the catch of game fish is generally lower. It goes up during the second season, but during the third there is a tendency for panfish, and especially for coarse fish like carp, to overtake the game species in numbers. Apparently there needs to be some additional protection for bass and other game fish, and possibly legalization of netting for carp, to maintain a desirable balance.

Science News Letter, March 1, 1941

Won't Stop Conservation

AMERICA'S defense needs will not run counter to the interests of conservation, whatever the present emergency may bring, Rep. Ross A. Collins of Mississippi assured the sixth North American Wildlife Conference.

Mr. Collins, chairman of a special House Subcommittee on Defense Appropriations, declared that conditions now are entirely different from what they were in 1917-18, when timber was recklessly cut to provide parts for airplanes, rangeland plowed up to increase wheat acreage, and fisheries exploited far more intensively than they could bear without long-lasting damage.

"Fighter and bomber planes are of all metal construction now," Mr. Collins said. "If anybody puts up a plea that spruce has to be cut wholesale for warplane construction, look carefully to see if he hasn't some interest in raiding our forests to get cheap lumber for non-defense purposes.

"The same thing goes in the case of farm and fisheries product. Our surpluses in basic foods and fibers are still so heavy that we are still seeking ways to reduce cotton acreage, and to dispose of stocks of corn and wheat now on hand. So there is no need to plow fields that have been reclaimed from dust bowls or destructive gullying."

Defense programs have given the U. S. Department of Agriculture some new problems in transplanting farmers, H. W. Hochbaum, of the U. S. Department of Agriculture's Extension Service, told the conference.

Great tracts have been purchased for cantonments, maneuvering grounds and artillery and bombing ranges. Naturally, these have been acquired as far as possible in thinly populated, low value areas, so as to dislocate as few farmers as possible. However, thousands of farm families must find new homes and it is one of the cares of the Department of Agriculture to make the re-location with a minimum of dislocation.

Another problem has been the settling of rich lands along the Mississippi made available for secure farming as the result of the great flood control programs of recent years. Hitherto these lands have been swamps and shallow lakes, or at best have been subject to so frequent flooding that farming was impossible. Now they are valuable additions to the nation's good land capital.

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•First Glances at New Books

Additional Reviews On Page 144

HISTORY

THE CULTURAL APPROACH TO HISTORY —Caroline F. Ware, ed. — *Columbia Univ. Press,* 359 p., $3.50. Gathered in this very significant volume are the views of many specialists of our day, explaining how the writing of history is changing. Our era has become deeply conscious of the force of societies in shaping events. Contributing to the discussion, which was originally in the form of papers at the American Historical Association's 1939 meeting, are an anthropologist, social psychologist, psychoanalyst, and specialists in linguistics, folk music, and population study, as well as historians.

Science News Letter, March 1, 1941

BIOCHEMISTRY

THE BIOCHEMISTRY OF SYMBIOTIC NITROGEN FIXATION — Perry W. Wilson — *Univ. of Wisconsin,* 302 p., illus., $3.50. A monograph of great usefulness to plant physiologists, agronomists, and all students of nutritional problems in plants. The present knowledge of nitrogen fixation by symbiotic organisms is ably and thoroughly summarized, and directions are indicated in which future research may be fruitfully conducted.

Science News Letter, March 1, 1941

MEDICINE

HEALTHFUL LIVING (rev. ed.) — Harold S. Diehl—*Whittlesey House,* 499 p., illus., $2.75. Authoritative advice on the business of keeping well, written in a style that is easy to understand and to follow.

Science News Letter, March 1, 1941

ZOOLOGY

PONDS, POOLS, AND PUDDLES—Marjorie Ethel Wells and Essie G. Hanson — *Binfords & Mort,* 192 p., illus., $1.50. A little book about the invertebrate animal life forms most commonly found in small fresh-water bodies. Although apparently intended for a young audience, no attempt has been made to "write down" to a junior level by leaving out "hard" words.

Science News Letter, March 1, 1941

BOTANY

PLANTS AND MAN — Clarence J. Hylander and Oran B. Stanley — *Blakiston,* 518 p., illus., $3. A well-arranged, cleanly-illustrated textbook in economic botany, that can serve excellently as a general reference work also. The devotion of the first half-dozen chapters to an exposition of the general principles of botany, before specific discussion of economic plants is undertaken at all, is most praiseworthy.

Science News Letter, March 1, 1941

PALEOBOTANY

AN INTRODUCTION TO THE STUDY OF FOSSIL PLANTS — John Walton — *Macmillan,* 188 p., illus., $3.75. The plant kingdom's long history is passed in review, from its first faint beginnings in the pre-Cambrian down to the dawn of modern times, and the structures and probable life-histories of typical genera of all the principal groups are set forth in lucid text and with splendid illustrations.

Science News Letter, March 1, 1941

HISTORY

MIND THROUGH THE AGES, A History of Human Intelligence—Martin Stevers —*Doubleday, Doran,* 521 p., illus., $3.75. A panorama of progress from the Stone Age, designed to show how ideas have evolved, and how man struggled against odds to form patterns of society and to develop invention, commerce, and sciences. The history ends with the present, and the question of how to use the heritage most fruitfully.

Science News Letter, March 1, 1941

ELECTRICAL ENGINEERING

THE METER AT WORK—John F. Rider —*John F. Rider Publisher,* 152 p., 138 illus. and diagrams, $1.25. This is a practical book for service men and others who employ electric meters. It has a novel construction, the illustrations constituting the upper third of the book, and being separate from the text below. Thus, any figure may be kept constantly in view, while the lower pages are being turned.

Science News Letter, March 1, 1941

NAVAL SCIENCE

HOW TO BE A NAVAL OFFICER—Yates Stirling, Jr.—*McBride,* 194 p., illus., $1.75. The Navy has always had decided attractions as a career, and right now, with huge increases in officer and enlisted personnel necessary, it offers unusual opportunities to interested young men. This book will give to youths ambitious to enter Annapolis a very good idea of what their life there will be like, and what will be their work after graduation.

Science News Letter, March 1, 1941

GEOGRAPHY

AN ATLAS OF WORLD REVIEW—Clifford H. MacFadden—*Crowell,* 68 p., maps, $1.95. An atlas in the modern manner, organized to present ready-reference background for the world's news. Readers today want to see on the map shipping routes, naval bases, location of strategic resources, and reasons for Balkan vulnerability. This small atlas provides over 100 maps, plus text comment.

Science News Letter, March 1, 1941

ETHNOLOGY

YOU AND YOUR SUPERSTITIONS—Brewton Berry—*Lucas Brothers,* Columbia, Mo., 249 p., illus., $2.13. Summing up a comprehensive and entertaining account of superstitions, past and present, the author concludes that superstitions still flourish because man is not good at logic, he is conservative, and he finds civilized life still insecure and precarious "and something has to be done about it." Only security will smash superstition, is his final word.

Science News Letter, March 1, 1941

PHYSICS—CHEMISTRY

PHYSICAL CHEMISTRY, An Introduction —E. A. Moelwyn-Hughes—*Cambridge* (*Macmillan*), 660 p., $9.50. This copious work, the author explains, is designed to provide, in English, a treatise that covers the ground from an introduction up to the most advanced university courses. It is complete in itself, for all theorems are derived, and no proof taken for granted. Naturally, the book is highly technical.

Science News Letter, March 1, 1941

PSYCHOLOGY

GENERAL PSYCHOLOGY—Raymond B. Cattell—*Sci-Art Publishers,* 624 p., illus., $3.50. An elementary textbook by the G. Stanley Hall professor of genetic psychology at Clark University.

Science News Letter, March 1, 1941

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•First Glances at New Books

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ASTRONOMY

SPLENDORS OF THE SKY—Charles and Helen Federer, comps.—*Sky Publishing Corp.*, 35 p., illus., 25c. Many photographs of comets, nebulae and other astronomical objects, taken with great telescopes, have an aesthetic appeal, even aside from their scientific interest and the impressive character of the objects they portray. Sixty-two illustrations, beautifully reproduced, some, of these objects, others, of the instruments with which they were taken, make this paper-bound booklet a publication that many will enjoy. Accurate and concise captions briefly explain the pictures, a number of which are full page (9⅞" x 11⅞") in size.

Science News Letter, March 1, 1941

RELIGION—LINGUISTICS

THE NEW TESTAMENT, According to the Eastern Text—Trans. from original Aramaic sources by George M. Lamsa—*Holman*, 527 p., maps, cloth $3, Levant grain $4, leather $5. People who speak Aramaic, the language of Jesus, and who have kept alive old idioms and customs in isolated areas of the Near East, hold a key to many obscure passages in Biblical text. Coming from such a region, the Assyrian theologian, Dr. Lamsa, presents in this translation the Aramaic sense of such passages, keeping meanwhile to the dignified King James style. For comparative study, verses significantly different from the Authorized King James Version are indicated on each page.

Science News Letter, March 1, 1941

GENERAL SCIENCE

REPORT ON THE PROGRESS AND CONDITION OF THE UNITED STATES NATIONAL MUSEUM FOR THE YEAR ENDED JUNE 30, 1940—Smithsonian Institution, U. S. National Museum—*Govt. Print. Off.*, 118 p., 15c.

Science News Letter, March 1, 1941

BIOLOGY

MICROBIOLOGY AND PATHOLOGY (5th ed.)—Charles G. Sinclair—*Davis*, 393 p., illus., $3.25.

Science News Letter, March 1, 1941

ENGINEERING

MODEL RAILROADS, Planning, Construction, Operation—Edwin P. Alexander—*Norton*, 283 p., illus., $4. If anyone entertains doubts that model railroading had become a serious hobby for adults this book should dispel them. Of particular interest to the model builder in his striving for exactness are the numerous detailed plans and photographs of full-size equipment.

Science News Letter, March 1, 1941

ASTRONOMY

ASTRONOMY—Clyde Fisher and Marian Lockwood—*Wiley*, 205 p., illus., $2.25. In this interestingly and concisely written book, the curator-in-chief of New York's famous Hayden Planetarium and one of his associates have made an important contribution to the literature of elementary astronomy.

Science News Letter, March 1, 1941

DOCUMENTATION

ARCHIVES AND LIBRARIES, 1940 — A. F. Kuhlman, ed. — *Amer. Library Assoc.*, 136 p., planographed, $2. Papers presented at the 1940 Conference of the A. L. A., at joint sessions of the Committee on Archives and Libraries with kindred groups.

Science News Letter, March 1, 1941

MEDICINE

THE ALCOHOL PROBLEM VISUALIZED (2d ed.)—*The National Forum*, 96 p., illus., 75c.

Science News Letter, March 1, 1941

RADIO

AMATEUR RADIO, A Beginner's Guide—J. Douglas Fortune—*Thordarson Electric Mfg. Co.*, 155 p., illus., 75c. Complete and concise directions for anyone who wants to get a start in the fascinating hobby of amateur radio, either by code or phone. Though published by a large manufacturer of radio parts, the author, who has had wide experience, points out that products of other makers can be used just as well as those described.

Science News Letter, March 1, 1941

ENGINEERING

CONCRETE DESIGN AND CONSTRUCTION (Rev. ed.)—W. Herbert Gibson and Walter Loring Webb—*American Technical Society*, 500 p., illus., $4.75. The treatise supplies the information needed by engineer, contractor and student interested in the design and manufacture of concrete, plain and reinforced. Such matters as the bonding of steel and concrete, allowable working stresses as well as the design of slabs and beams are discussed.

Science News Letter, March 1, 1941

RADIO

THE RADIO AMATEUR'S HANDBOOK, 1941 (18th ed.)—Headquarters Staff of the American Radio Relay League—*American Radio Relay League*, 552 p., illus., paper, $1; buckram, $2.50; Spanish edition, $1.50. Anyone interested in amateur radio knows of this annual publication and how useful it is. Such persons only need be informed of the publication of a new edition to make them order a copy.

Science News Letter, March 1, 1941

MEDICINE

THE CONTROL OF TUBERCULOSIS IN THE UNITED STATES (Rev. ed.)—Philip P. Jacobs—*Natl. Tuberculosis Assn.*, 387 p., $2. Of chief interest to workers in the fight against tuberculosis, this book also will provide information and valuable pointers for public health workers in general. Those who knew the author will find the book a fitting memorial to the man and his life-work.

Science News Letter, March 1, 1941

ORNITHOLOGY

A FIELD KEY TO OUR COMMON BIRDS—Irene T. Rorimer—*Cleveland Museum of Natural History*, 160 p., illus., $1.50. A little, flexibly bound book, easy to slip into a pocket with plenty of small but clear illustrations (partly in color), a dichotomous field key, and compact analytical descriptions. Bird-watchers should find this a highly satisfactory field companion.

Science News Letter, March 1, 1941

PHOTOGRAPHY

HOW TO BUILD AND EQUIP A MODERN DARKROOM—Nestor Barrett and Ralph Wyckoff—*Camera Craft*, 133 p., illus., $2. Worthwhile hints for anyone who uses a darkroom and especially interesting to anyone planning to construct one.

Science News Letter, March 1, 1941

COOKERY

FOODS OF OUR FOREFATHERS—Gertrude I. Thomas—*F. A. Davis*, 228 p., illus., $2.50. Our ancestors may have been pioneers, but after reading this book we cannot believe they fared badly. The book is divided into three groupings of Southern, Middle and New England colonies; the text describes colonial life of the English, Dutch, French, and other localities, and gives recipes which will make your mouth water.

Science News Letter, March 1, 1941